

What is claimed is:

1. An isolated polynucleotide consisting of the nucleic acid sequence set forth in SEQ ID NO:1.
2. An isolated polynucleotide comprising the nucleic acid sequence set forth in SEQ ID NO:1.
3. An isolated polynucleotide encoding a polypeptide comprising the amino acid sequence set forth in SEQ ID NO:2.
4. An isolated polynucleotide encoding a polypeptide the sequence of which comprises the amino acid sequence of SEQ ID NO:2 with 0 to 50 conservative amino acid substitutions, wherein the polypeptide is a very long chain fatty acid acyl (VLCFA) CoA synthetase that converts a very long chain fatty acid to a thioester derivative.
5. The isolated polynucleotide of claim 4, wherein the amino acid sequence comprises 0 to 30 conservative amino acid substitutions.
6. The isolated polynucleotide of claim 4, wherein the amino acid sequence comprises 0 to 10 conservative amino acid substitutions.
7. An isolated polynucleotide that hybridizes under stringent conditions to a polynucleotide comprising the nucleic acid sequence of SEQ ID NO:1, or complement

thereof, wherein the polypeptide is a very long chain fatty acid acyl (VLCFA) CoA synthetase that converts a very long chain fatty acid to a thioester derivative.

- 5        8.    An isolated polynucleotide comprising a nucleotide sequence that is at least 80% homologous to the nucleic acid sequence of SEQ ID NO:1, wherein the polypeptide is a very long chain fatty acid acyl (VLCFA) CoA synthetase that converts a very long chain fatty acid to a thioester derivative.
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9.    The isolated polynucleotide of claim 8 comprising a nucleotide sequence that is at least 90% homologous to the sequence of SEQ ID NO:1.
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10.   The isolated polynucleotide of claim 8 comprising a nucleotide sequence that is at least 95% homologous to the sequence of SEQ ID NO:1.
- 20       11.   An isolated polynucleotide comprising the nucleic acid sequence set forth in SEQ ID NO:1, wherein thymine is uridine.
- 25       12.   An isolated polynucleotide comprising a sequence that encodes a polypeptide the amino acid sequence of which is at least 80% identical to the sequence of SEQ ID NO:2.
- 30       13.   The isolated polynucleotide of claim 12, wherein the amino acid sequence is at least 90% identical to the sequence of SEQ ID NO:2.

14. The isolated polynucleotide of claim 12, wherein the amino acid sequence is at least 95% identical to the sequence of SEQ ID NO:2

5 15. A vector comprising the polynucleotide of claim 1, 2, 3, 4, 7, 8, 11 or 12.

16. The vector of claim 12, wherein the vector is an expression vector.

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17. The vector of claim 12, wherein the vector is a plasmid.

18. The vector of claim 12, wherein the vector is a viral vector.

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19. A host cell transformed with the vector of claim 12.

20. The host cell of claim 16, wherein the cell is a eukaryotic cell.

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21. The host cell of claim 16, wherein the cell is a prokaryotic cell.